

## **Short Term Overreaction Effect: Evidence on the Turkish Stock Market**

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### **Abstract**

In this paper, we empirically examine the short term overreaction effect in the Istanbul Stock Exchange using daily stock data from January 1999 to December 2003. The study period covers the pre- and post- Turkish financial crisis period. Consistent with other prior studies on other markets, we find evidence of short term overreaction effect in the Istanbul Stock Exchange prior and post financial crisis. Our analysis highlights that stocks that display a large price increase (winners) show an evidence of overreaction in the short run, however, stocks that display a large price decline (losers) indicate no significant evidence. We also find the price reversal for winners in pre-crisis period is more pronounced than in post-crisis period. These results indicate a diminished degree of overreaction after the crisis period which may be attributable to the behaviors of traders.

## **Introduction**

The Efficient Market Hypothesis (EMH) states that all relevant information is completely reflected in the price of financial assets and that change in the prices of financial assets can not be predicted, therefore, failing to provide abnormal profit opportunities. However, in recent studies, EMH has been challenged by the documentation of “Overreaction Hypothesis” which shows that past prices can forecast future movements in prices and those profitable investment strategies can be created to take advantage of overreaction effect. Therefore, further studies of the overreaction phenomena have significant implications not only for financial academics and practitioners but also for the investors.

While the efficiency of stock markets has been studied mostly for developed markets, the analysis of the efficiency on emerging stock markets has begun in recent years. Empirically, the studies have found important differences among markets whether they are classified as either emerging or developed markets which reveal that abnormal returns following the shocks are significantly larger for emerging markets. Some of the reasons behind the significant abnormal returns in those markets are the globalization effects, the removal of trade barriers and the advance in the communication technology. Therefore, domestic and international investors can gain enormous benefits by diversifying their portfolios in these markets.

Istanbul Stock Exchange (ISE), being established in 1986, has become one of the rapidly growing emerging markets. As a leading emerging market, ISE, which is smaller, less liquid and more volatile than developed markets has begun to suggest attractive investment alternatives to investors all around the world. The participation of foreign investors in the ISE has increased from 1.8 % in 1990 to 53.7 % in 1999 and reached to nearly above 75% in 2008.

The main purpose of this paper is to contribute to the short term overreaction literature by using daily return stock data of Istanbul Stock Exchange over the period of 1999-2003. The reason of selecting this time period is to investigate the impact of the February 2001 Turkish financial crisis. As our data extends to the period of Turkish financial crisis, this will provide a better understanding of the trading behaviors of investors before and after the crisis. This paper contributes to the existing literature in some respects. First, this study examines the overreaction hypothesis in an emerging market, ISE, while previous studies generally have focused on developed markets. Second, we investigate individual company stock price performance rather than the portfolio performance regarding pre- and post- crisis reaction.

The rest of the paper is organized as follows. Section II gives brief review in this literature. Then, the data and methodology are discussed in section III. Empirical results are presented in the section IV and final section concludes.

## **Literature Review**

All available information is fully reflected into prices of financial assets in “informationally efficient” markets. Theoretically, abnormal returns cannot be earned by using investment strategies based on available information. One of the potential challenge for the “Efficient Market Hypothesis” is referred to as the ‘overreaction

phenomena” comes from DeBondt and Thaler (1985). They suggested, using U.S. data, which prior losers over a long term period outperform prior winner over a subsequent holding period of the same length of time, following the physiological study of Kahneman and Tversky (1982), who argue that investors tend to overweight recent information and underweight prior information.

More specifically, the strategy of buying the losers and short selling the winners will produce abnormal profits in the long run. These profits, called as contrarian profits, are due to the investors’ excessive optimistic and pessimistic reactions to information. Several studies have examined the overreaction hypothesis in financial markets in both short term and long-term horizons. Although the most recent studies have been based on the long-term horizons, the evidence on the cause of long run returns reversals are conflicting. However, there are a number of studies that attempt to reveal the evidence of the short-term return reversals, which are more consistent in favor of overreaction. Moreover, investigating short-term overreaction has advantages over the long-term overreaction tests. Lin (1988), who examined the daily, weekly and monthly returns for Taiwan Stock Market found the existence of overreaction. Brown and Harlow (1988) examined the overreaction issue by using monthly data of CRSP-listed NYSE firms in the period of 1946 and 1983. While the winners do not show any decline after the first month, the losers indicated large price reversals. Zarowin (1989) presented the existence of stock market overreaction in the short run by ranking the common stocks with respect to their performance during a given month and concluded that the market was weak form inefficient in the short run. Atkins and Dyl (1990) investigated the behavior of common stock prices in NYSE after a large price change during a single trading day and provided evidence of overreaction, especially in the case of price declines. Ferri and Chung-ki (1996) illustrated the evidence of overreaction hypothesis in the S&P 500 index from 1962 to 1991 using daily data.

In one of the more recent studies, Larson and Madura (2003) studied NYSE stocks that experienced a one-day price change over the period 1988 to 1998 and found overreaction effect in response to uninformed events for gainers and under-reaction in both informed and uninformed events for losers. Ma et. al. (2005) examined the overreaction hypothesis by studying the price reversal behavior of NYSE and Nasdaq securities between 1996 and 1997. While they provide evidence of overreaction effects for both Nasdaq gainers and losers, no such evidence is found for NYSE gainers and losers.

Overreaction hypothesis is also investigated in some of the international markets, which are Spain (Alonso and Rubio (1990)), Canada (Kryzanowsky and Zhang (1992)), Australia (Brailsford (1992)), UK (Clare and Thomas (1995)), Japan (Chang et al. (1995)), Hong Kong (Akhigbe et al. 1998)), Brazil (DaCosta and Newton (1994), Richards (1997)), New Zealand (Bowman and Iverson (1998)), China (Wang et al. (2004)), Greece (Anthoniou et. al., 2005) and London (Spyrou et.al., 2007).

### **Data and Methodology**

For the empirical analysis, daily closing prices of 190 stocks traded in one of the major Turkish equity indices (ISE) are examined for the 4-year period between January 1999 and December 2003. These sample data were obtained from the IBS. We divide the sample period into two sub-periods. The whole sample period consists of 1216 trading

days in which the first consists of 500 trading days from January 5, 1999 through January 31, 2001 and the second period is composed of 716 trading days from February 1, 2001 through December 31, 2003. We exclude some days in the sample period which have missing price data.

To investigate the short-term overreaction effect, we firstly compute the raw return of stocks on each day  $t$  ( $r_{i,t}$ ) as the difference between today's and previous day's closing price ( $P$ ) as follows:

$$r_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

Abnormal return for each stock on the two sub-periods is computed using a market-adjusted model<sup>1</sup>:

$$AR_{i,t} = r_{i,t} - E(r_{i,t}) \quad (2)$$

where  $AR_{i,t}$  is the abnormal return on each stock  $i$  for day  $t$ ;  $r_{i,t}$  is the return of each stock  $i$  on day  $t$  and  $E(r_{i,t})$  is the expected return on each stock  $i$  for day  $t$ . The expected return is assumed to be the return on the market index.

Based on the abnormal returns, winners and losers are selected for the two sub-periods. On each sample day, the stock with the lowest return is called as the "loser" of that day and the stock with the highest return is called as the "winner" of that day. Pre-crisis period sample includes 485 winners and losers and post-crisis period sample includes 701 winners and losers.

Finally, the abnormal returns for each loser and winner on each trading day from  $t = -7$  and  $t = +7$  are computed and then the average abnormal returns for each loser and winner on each trading day from  $t = -7$  and  $t = +7$  are cumulated over different days to calculate the cumulative abnormal return:

$$CAR_{i,t} = \sum_{t=-7}^{+7} AR_{i,t} \quad (3)$$

## Empirical Results

The average daily abnormal returns from  $t = -7$  and  $t = +7$  for the winners and losers in pre- and post-crisis period are reported in Table 1 and 2 respectively. In those tables, day 0 indicates the day where a significant price change of the stocks occurs.

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<sup>1</sup> Strong (1992) discussed the strengths of the market-adjusted model.

**Table 1: Average Daily Abnormal Returns for ISE-100 Stocks that indicates a large one day price increase or decrease within the period of January 5, 1999 through January 31, 2001**

Day(t)	1999-2001			
	Abnormal Return	t-statistics	Abnormal Return	t-statistics
	The Winner Sample (N=485)		The Loser Sample (N=485)	
-7	0.581797	2.294814**	0.766884	2.784166***
-6	0.341884	1.330598	1.076951	3.781300***
-5	0.182781	0.703928	0.582405	2.126821**
-4	-0.062553	-0.252161	0.532439	1.981085**
-3	0.846486	3.410896***	1.477918	4.722299***
-2	0.717411	2.543642**	1.429111	4.001720***
-1	2.436467	6.466963***	1.052307	2.877353***
0	16.025264	21.803987***	-11.277304	-19.230200***
1	1.727013	4.459111***	-0.708542	-2.174070**
2	-0.136683	-0.415161	-0.382208	-1.393640
3	-0.715141	-2.309653**	-0.194723	-0.803960
4	0.089952	0.301570	-0.112319	-0.456530
5	0.186887	0.651885	-0.601330	-2.515440**
6	-0.158658	-0.558179	-0.244671	-0.976040
7	0.004440	0.016307	-0.360022	-1.543370

\*\*\*Denotes significance at the 1% level (two-tailed test)

\*\*Denotes significance at the 5% level (two-tailed test)

\*Denotes significance at the 10% level (two-tailed test)

The average daily abnormal returns for the winners and losers in period 1999-2001 are shown in Table1. In this table, the average daily abnormal returns obtained by the winners are negative for three of the seven days following the large one day price increase. However, the daily abnormal return on day  $t = 3$  is statistically significant at the 5% level even though on day  $t = 2$  and  $t = 6$  not statistically significant. After the large price increase which denotes day 0, the price reversal does not occur on the first day. However, the reversals take place on day 3 as the market is not able to correct its previous information in a timely manner. Moreover, significant positive abnormal returns obtained on days  $t = -3$ ,  $t = -2$  and  $t = -1$  are due to the information leakage.

The large negative return that occurs on day  $t = 0$  is the result of the large decline in price. As opposed to the winners, price reversals for losers can not be obtained in the pre-crisis period which can be interpreted as no evidence of overreaction.

**Table 2: Average Daily Abnormal Returns for ISE-100 Stocks that indicates a large one day price increase or decrease within the period of February 1, 2001 through December 31, 2003**

	2001-2003			
Day(t)	Abnormal Return	t-statistics	Abnormal Return	t-statistics
	The Winner Sample (N=701)		The Loser Sample (N=701)	
-7	0.618897	3.400242***	1.041148	5.228637***
-6	0.437705	2.376956**	1.027202	5.013088***
-5	0.592522	3.346280***	1.183094	5.374692***
-4	0.598463	3.160672***	1.424188	6.336834***
-3	0.673227	3.369772***	1.895305	7.339178***
-2	1.055852	4.978101***	1.714117	6.311741***
-1	2.451450	9.040694***	1.443817	4.760019***
0	14.660618	26.308445***	-10.326258	-20.474300***
1	1.510407	4.823650***	-0.783581	-3.047420***
2	-0.256768	-0.982589	-0.548478	-2.523280**
3	-0.354136	-1.464886	-0.408084	-2.015040**
4	-0.538773	-1.658767*	-0.232604	-1.283380
5	-0.157455	-0.750889	-0.538020	-2.821920***
6	-0.265152	-1.313957	-0.435337	-2.366300**
7	-0.246704	-1.255414	-0.227266	-1.373060

\*\*\*Denotes significance at the 1% level (two-tailed test)

\*\*Denotes significance at the 5% level (two-tailed test)

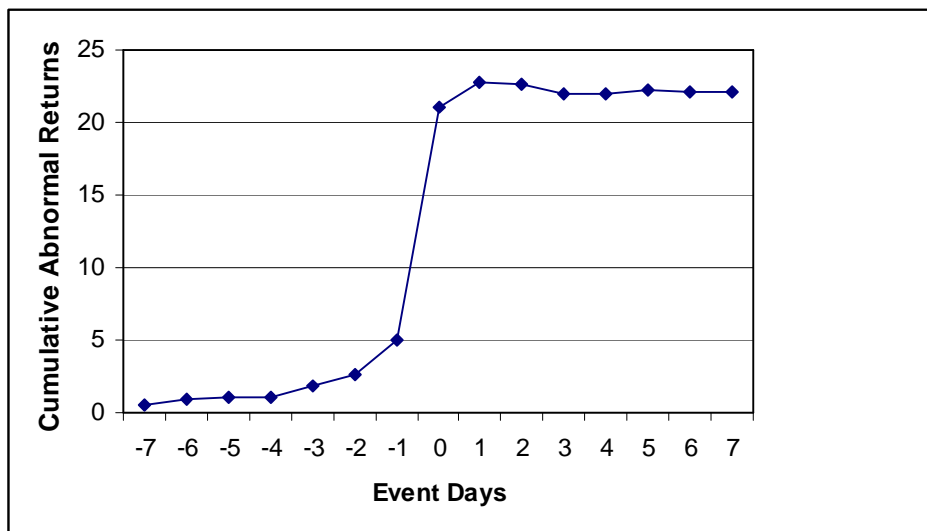
\*Denotes significance at the 10% level (two-tailed test)

The average daily abnormal returns for the winners and losers in period 2001-2003 are shown in Table 2. Consistent with the results in the pre-crisis period, we document the evidence of overreaction for the winners but not for the losers in the post-crisis period. After a large price increase for winners, a significant price reversals occur on day  $t = 4$  at 10% level while the average daily abnormal returns are negative but not statistically significant for six of the seven days following the day  $t = 0$ .

In both tables, we observed that positive daily abnormal returns during seven days preceding the day of the large price decline are statistically significant at the % 1 and % 5 levels. This indicates that there is no information leakage in pre-event period for losers.

It is also interesting to note, from Figure 1 and 3, that cumulative abnormal returns earned by stocks indicated a large increase in price during a single trading day for the period surrounding the day of the price increase both in pre- and post-crisis period.

**Figure 1: Cumulative Abnormal Returns for 190 stocks that exhibited a large price increase on day  $t = 0$  within the period of January 5, 1999 through January 31, 2001**



**Figure 2: Cumulative Abnormal Returns for 190 stocks that exhibited a large price decrease on day  $t = 0$  within the period of January 5, 1999 through January 31, 2001**

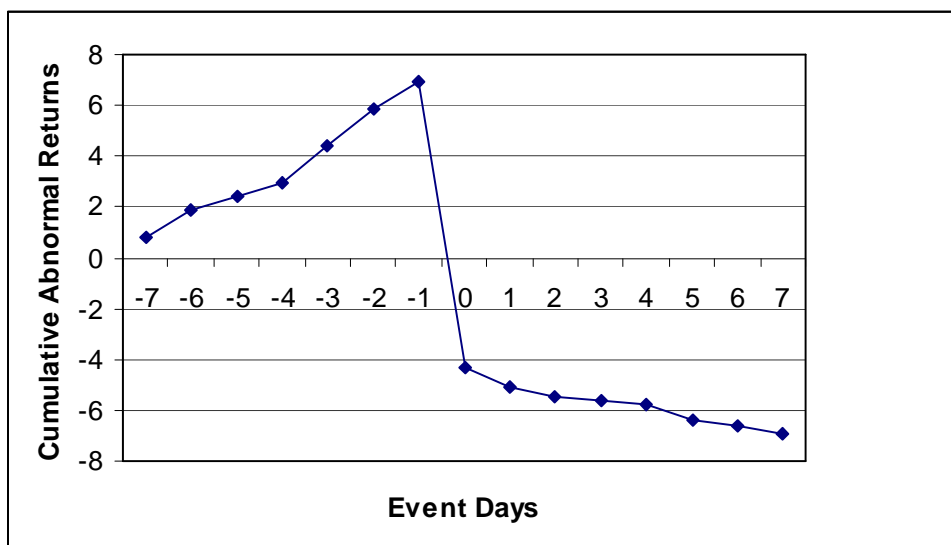
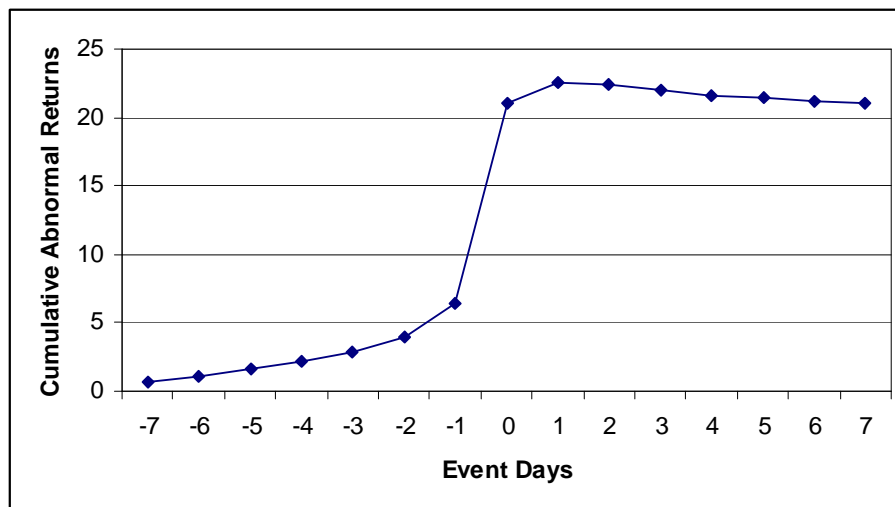
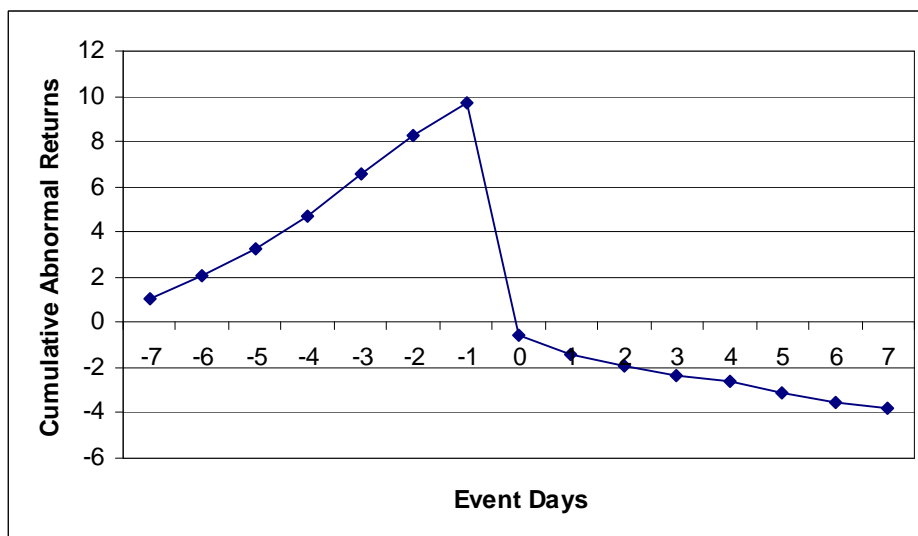


Figure 2 and 4 exhibits cumulative abnormal returns earned by stocks indicated a large price decline during a single trading day for the period surrounding the day of the price decline both in pre- and post-crisis period.

**Figure 3: Cumulative Abnormal Returns for 190 stocks that exhibited a large price increase on day  $t = 0$  within the period of February 1, 2001 through December 31, 2003**



**Figure 4: Cumulative Abnormal Returns for 190 stocks that exhibited a large price decrease on day  $t = 0$  within the period of February 1, 2001 through December 31, 2003**



The results obtained for the winners in pre- and post-crisis period indicates a significant evidence of overreaction. (See Figure 1 and 3) However, as seen from the results in Figures 2 and 4, the overreaction is not induced for losers both in pre- and post-crisis period.



The analysis of the pre- and post-crisis period results reveals the impact of the Turkish financial crisis, which caused a more volatile market. In this crisis period, the market is expected to be less efficient and heavily overreact to bad news. Yet, the findings of this study are rather surprising since the overreaction of the winners is more obvious in pre-crisis period than the post-crisis period. Moreover, the losers do not overreact significantly to information before and after the crisis. These results indicate that the stock market is more efficient than expected after the crisis, meaning that exhibiting less overreaction. To avoid the risk during the crisis period, investors become more conservative toward bad news and information. With the decrease of noise traders in the crisis, the importance of overreaction also decreases. However, when investors receive good news and information, the initial price increases in stocks encourage the noise traders to invest which leads to an increase the magnitude of overreaction.

## **Conclusion**

This paper highlights the empirical evidence of short term overreaction in the Turkish stock market. It differs from the previous studies in that this study considers the impact of the Turkish financial crisis by decomposing the whole sample into two sub periods, pre- and post-crisis period. We find that stocks that display a large price increase (winners) show an evidence of overreaction in the short run, however, stocks that display a large price decline (losers) indicate no significant evidence. We also find the price reversal for winners in pre-crisis period is more pronounced than in post-crisis period. These results indicate a diminished degree of overreaction after the crisis period which may be attributable to the behaviors of traders.

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